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IN THE CLAIMS:

Please cancel claim 34, without prejudice or disclaimer.

Please substitute the following amended claims for each of the corresponding original claims. A copy of the marked-up claims is attached.

1. (thrice amended) ~~A substrate etching apparatus comprising:~~
- (a) a chamber comprising a substrate support to support a substrate, a gas distributor to introduce an etchant gas into the chamber, a gas energizer to energize the etchant gas, a gas exhaust to exhaust gas from the chamber, and a radiation source;
- (b) one or more detectors to (i) detect an intensity of a first radiation originating from the radiation source and reflected from the substrate or a chamber wall and generate a sample signal, and (ii) detect an intensity of a second radiation emitted from the radiation source and generate a reference signal; and
- (c) a signal analyzer to normalize the sample signal relative to the reference signal by mathematically operating on the sample signal to compensate for both (i) a fluctuation in the reflected radiation that originates from the radiation source and (ii) background radiation that is not from the radiation source,
- whereby a thickness of a layer being etched on the substrate or chamber wall is determined from the normalized signal.

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23. (twice amended) A substrate etching apparatus comprising:

(a) a chamber capable of etching a substrate, the chamber comprising a substrate support to support the substrate, a gas distributor to introduce an etchant gas into the chamber, a gas energizer to energize the etchant gas, a gas exhaust to exhaust gas from the chamber, and a radiation source;

(b) a detector to detect a reflected radiation from the substrate or a chamber wall and generate a sample signal; and

F2 (c) a signal analyzer to receive the sample signal and determine a corrected sample signal, X_{nt} , using the expression $X_{nt} = X_t / \{Y_0 + C(Y_t - Y_0)\}$,

where C is a correction factor, Y_0 is a reference signal at time 0, X_t is the sample signal at time t, and Y_t is the reference signal at time t.

30. (twice amended) A substrate etching apparatus comprising:

(a) a chamber capable of etching a substrate, the chamber comprising a substrate support to support the substrate, a gas distributor to introduce an etchant gas into the chamber, a gas energizer to energize the etchant gas, a gas exhaust to exhaust gas from the chamber, and a radiation source;

(b) a sample detector to detect a reflected radiation from the substrate or a chamber wall and generate a sample signal;

F3 (c) a reference detector to detect a reference radiation from the radiation source and generate a reference signal;

(d) one or more first fibers to transmit the reference radiation from the radiation source to the reference detector and one or more second fibers to transmit radiation from the radiation source to the chamber, the first and second fibers arranged to individually receive radiation from the same spatial area of the radiation source; and

(e) a signal analyzer to normalize the sample signal relative to the reference signal by mathematically operating on the sample signal with the reference signal to generate a normalized signal, and determine a thickness of a layer being etched on the substrate or chamber wall from the normalized signal.

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38. ~~(twice amended)~~ A substrate etching apparatus comprising:

(a) a chamber capable of etching a substrate, the chamber comprising a substrate support to support the substrate, a gas distributor to introduce an etchant gas into the chamber, a gas energizer to energize the etchant gas into a plasma, a gas exhaust to exhaust gas from the chamber, and a radiation source other than a plasma in the chamber;

(b) a sample detector to detect a reflected radiation from the substrate or a chamber wall and generate a sample signal;

(c) a first reference detector to detect a first reference radiation from the plasma and generate a first reference signal, wherein the first reference radiation comprises a background radiation;

(d) a second reference detector to detect a second reference radiation from the radiation source and generate a second reference signal; and

(e) a signal analyzer to normalize the sample signal relative to the reference signal by mathematically operating on the sample signal to compensate for both (i) the background radiation from the plasma and (ii) a fluctuation in the reflected radiation.

whereby a thickness of a layer being etched on the substrate or chamber wall is determined from the normalized signal.

40. (thrice amended) A substrate etching apparatus comprising:

(a) a chamber comprising a substrate support to support a substrate, a gas distributor to introduce an etchant gas into the chamber, a gas energizer to energize the etchant gas, a gas exhaust to exhaust gas from the chamber, and a radiation source other than a plasma in a process zone in the chamber;

(b) one or more detectors to detect an intensity of a first radiation reflected from the substrate or a chamber wall to determine a thickness of a layer on the substrate or chamber wall, and detect an intensity of a second radiation from the radiation source; and

(c) a feedback controller to regulate a power level of the radiation source in relation to the detected intensity of the second radiation.

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44. (thrice amended) A substrate etching apparatus comprising:

(a) a chamber comprising a substrate support to support a substrate, a gas distributor to introduce an etchant gas into the chamber, a gas energizer to energize the etchant gas, a gas exhaust to exhaust gas from the chamber;

(b) a radiation source capable of generating a radiation;

(c) a first detector to detect a property of the radiation from the radiation source and generate a reference signal in relation to the property;

Fb (d) a radiation modulator in a path of a radiation being transmitted from the radiation source to the chamber, the radiation modulator being adapted to receive the reference signal and control a property of the radiation in relation to the reference signal; and

(e) a second detector in a path of the radiation, the second detector capable of detecting an intensity of the radiation reflected from the substrate or a chamber wall to determine a thickness of a layer being etched on the substrate or chamber wall.

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57. (twice amended) A substrate etching apparatus comprising:

a chamber comprising a substrate support to support a substrate, a gas distributor to introduce an etchant gas into the chamber, a gas energizer to energize the etchant gas, a gas exhaust to exhaust gas from the chamber, and a radiation source;

one or more detectors to detect an intensity of a radiation reflected from the substrate or a chamber wall to generate a sample signal that may be used to determine a thickness of a layer being etched on the substrate or chamber wall, and to detect a property of a radiation from the radiation source and generate a reference signal in relation to the property; and

a feedback controller to regulate a power level of the radiation source in relation to the reference signal.

60. (once amended) An apparatus according to claim 40 wherein

the one or more detectors generate a sample signal from the detected intensity of the first radiation and generate a reference signal from the detected intensity of the second radiation, and wherein the apparatus comprises a signal analyzer to normalize the sample signal relative to the reference signal to generate a normalized signal by mathematically operating on the sample signal with the reference signal, and determine a thickness of a layer on the substrate or chamber wall from the normalized signal.

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Please add the following claims:



61. (New) A substrate etching apparatus comprising:

(a) a chamber capable of etching a substrate, the chamber comprising a substrate support to support the substrate, a gas distributor to introduce an etchant gas into the chamber, a gas energizer to energize the etchant gas, a gas exhaust to exhaust gas from the chamber, and a radiation source;

(b) a sample detector to detect a reflected radiation from the substrate or a chamber wall and generate a sample signal;

(c) a reference detector to detect a reference radiation from the radiation source and generate a reference signal; and

(d) a signal analyzer adapted to normalize the sample signal to compensate for both (i) a fluctuation in the reflected radiation from the radiation source and (ii) background radiation that is not from the radiation source by:

(a) before the gas energizer energizes the etchant gas, measuring the sample and reference signals,

(b) after the gas energizer energizes the etchant gas but before substantially etching has occurred, measuring the sample signal, and

(c) during etching, measuring the sample and reference signals,

whereby a thickness of a layer being etched on the substrate or chamber wall is determined from the normalized signal.

62. (New) An apparatus according to claim 1 wherein (i) the radiation source comprises one or more of a lamp, laser source, or light-emitting diode, and wherein (ii) the background radiation comprises one or more of ambient plasma radiation, species emission charges, and plasma brightness variations.

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63. (New) An apparatus according to claim 1, wherein the signal analyzer comprises a signal analyzer to normalize the sample signal by:

(a) before the gas energizer energizes the etchant gas,

measuring the sample and reference signals,

(b) after the gas energizer energizes the etchant gas and before substantial etching has occurred, measuring the sample signal, and

(c) during etching, measuring the sample and reference signals.

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